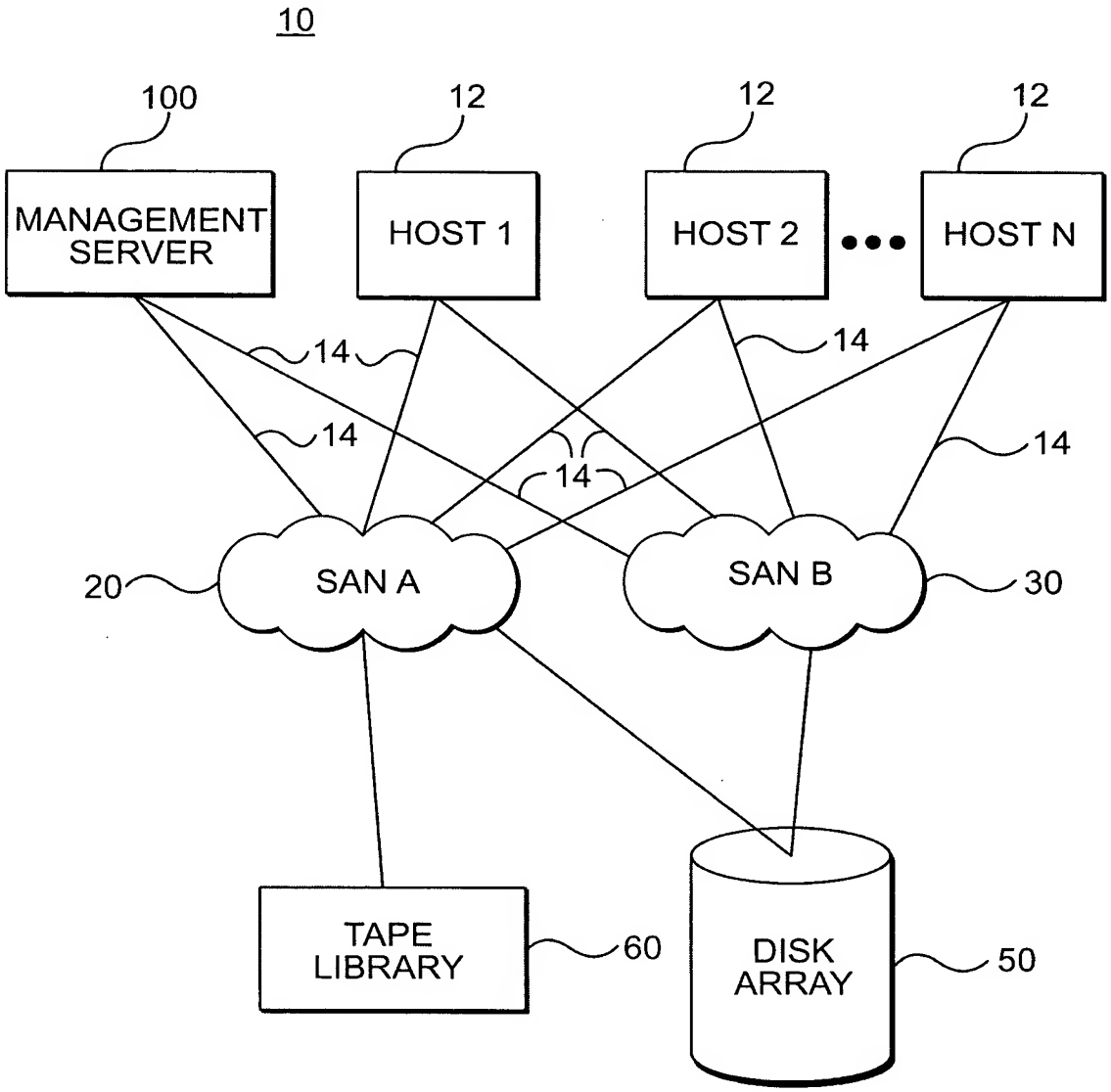
10
100
12
12
12
MANAGEMENT SERVER
HOST 1
HOST 2
HOST N
14
14
14
14
14
20
SAN A
SAN B
30
TAPE LIBRARY
60
DISK ARRAY
50

FIG. 1A

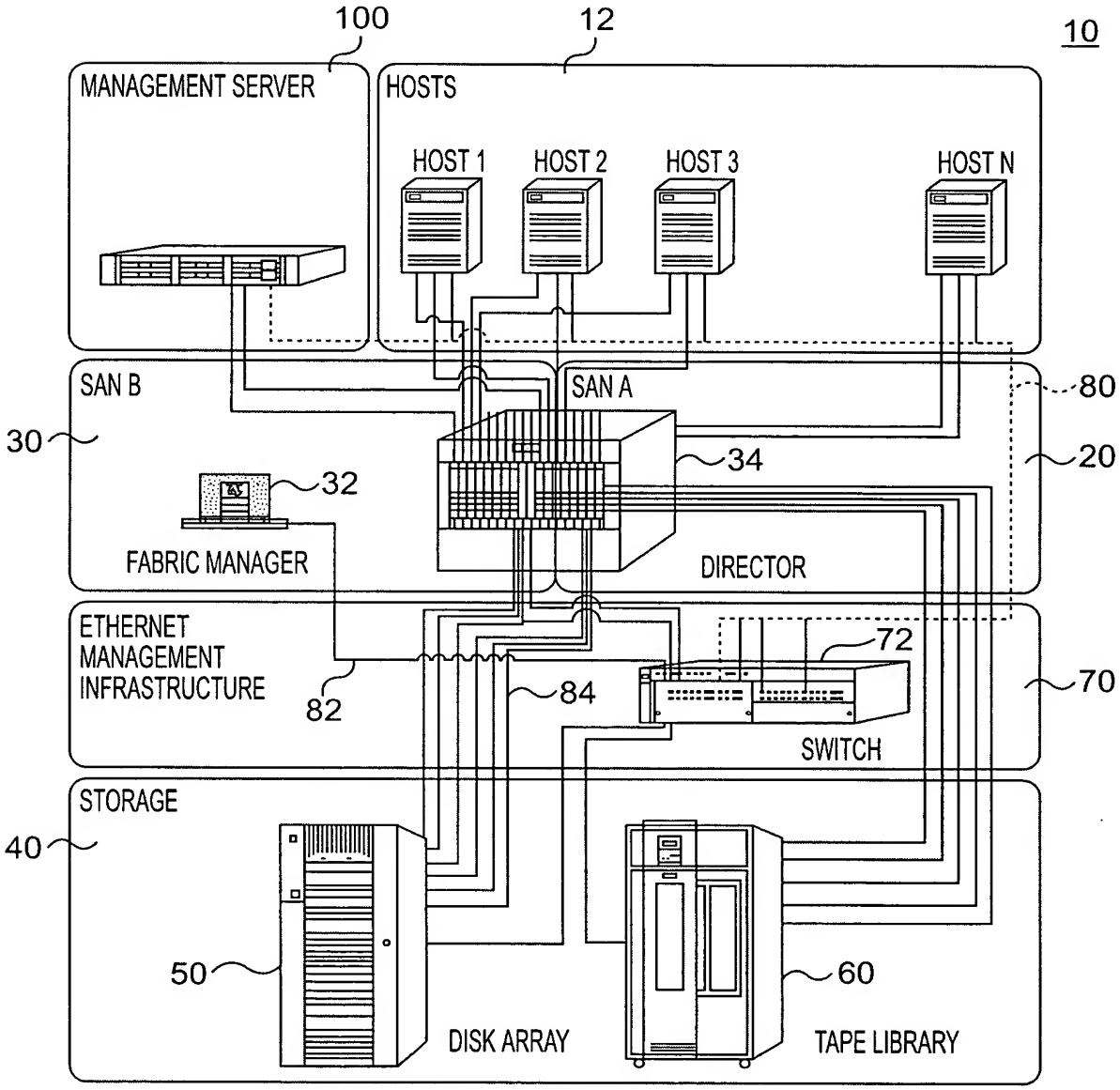
100
12
10
MANAGEMENT SERVER
HOSTS
HOST 1
HOST 2
HOST 3
HOST N
SAN B
SAN A
80
30
34
20
32
FABRIC MANAGER
DIRECTOR
ETHERNET
MANAGEMENT
INFRASTRUCTURE
72
82
84
70
SWITCH
STORAGE
40
50
60
DISK ARRAY
TAPE LIBRARY

FIG. 1B

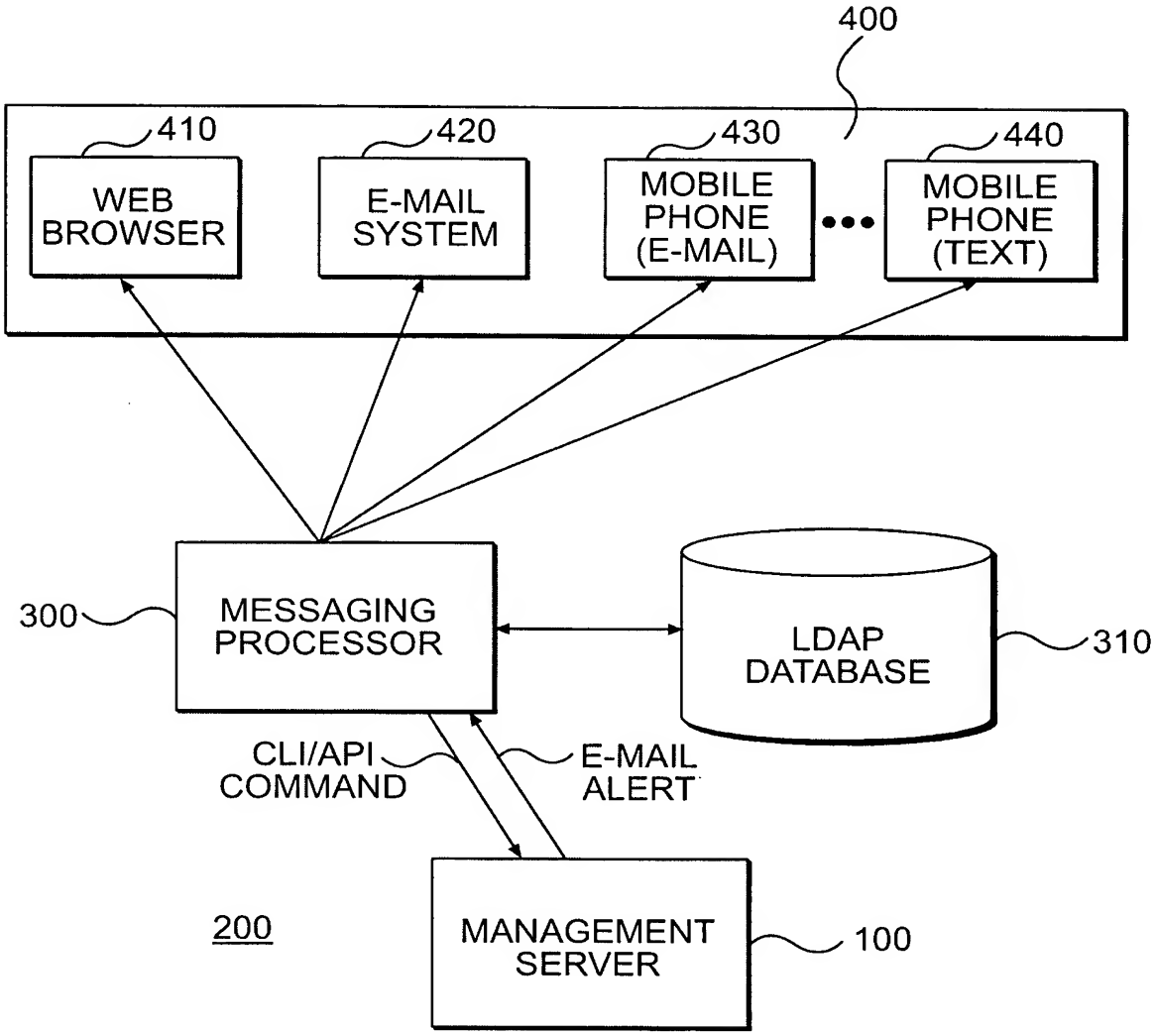
400
410
WEB BROWSER
420
E-MAIL SYSTEM
430
MOBILE PHONE (E-MAIL)
440
MOBILE PHONE (TEXT)
300
MESSAGING PROCESSOR
LDAP DATABASE
310
CLI/API COMMAND
E-MAIL ALERT
200
MANAGEMENT SERVER
100

FIG. 1C

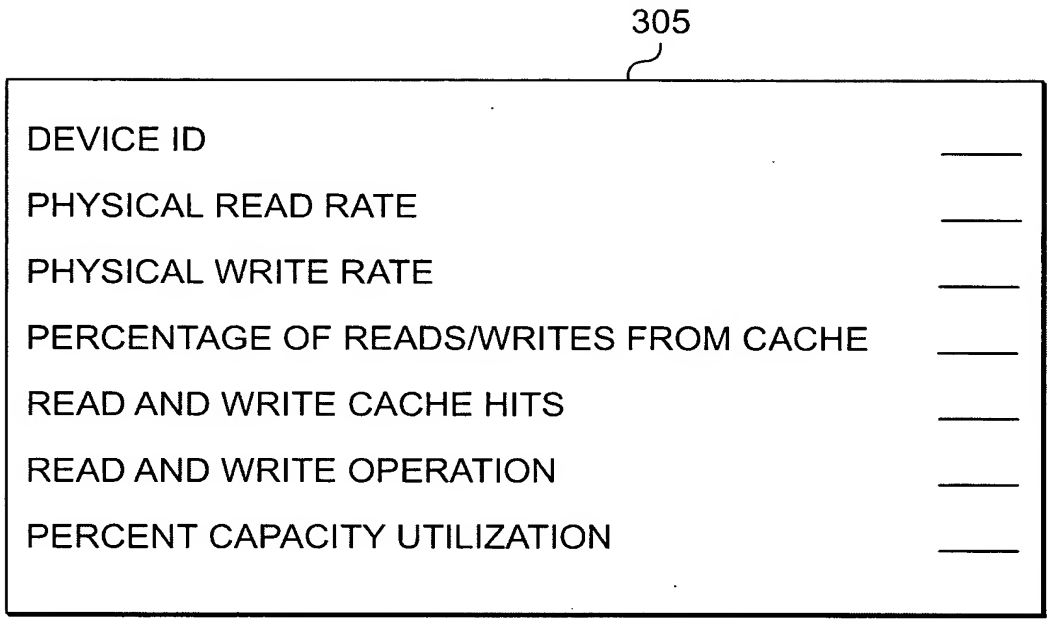
305
DEVICE ID
PHYSICAL READ RATE
PHYSICAL WRITE RATE
PERCENTAGE OF READS/WRITES FROM CACHE
READ AND WRITE CACHE HITS
READ AND WRITE OPERATION
PERCENT CAPACITY UTILIZATION

FIG. 1D

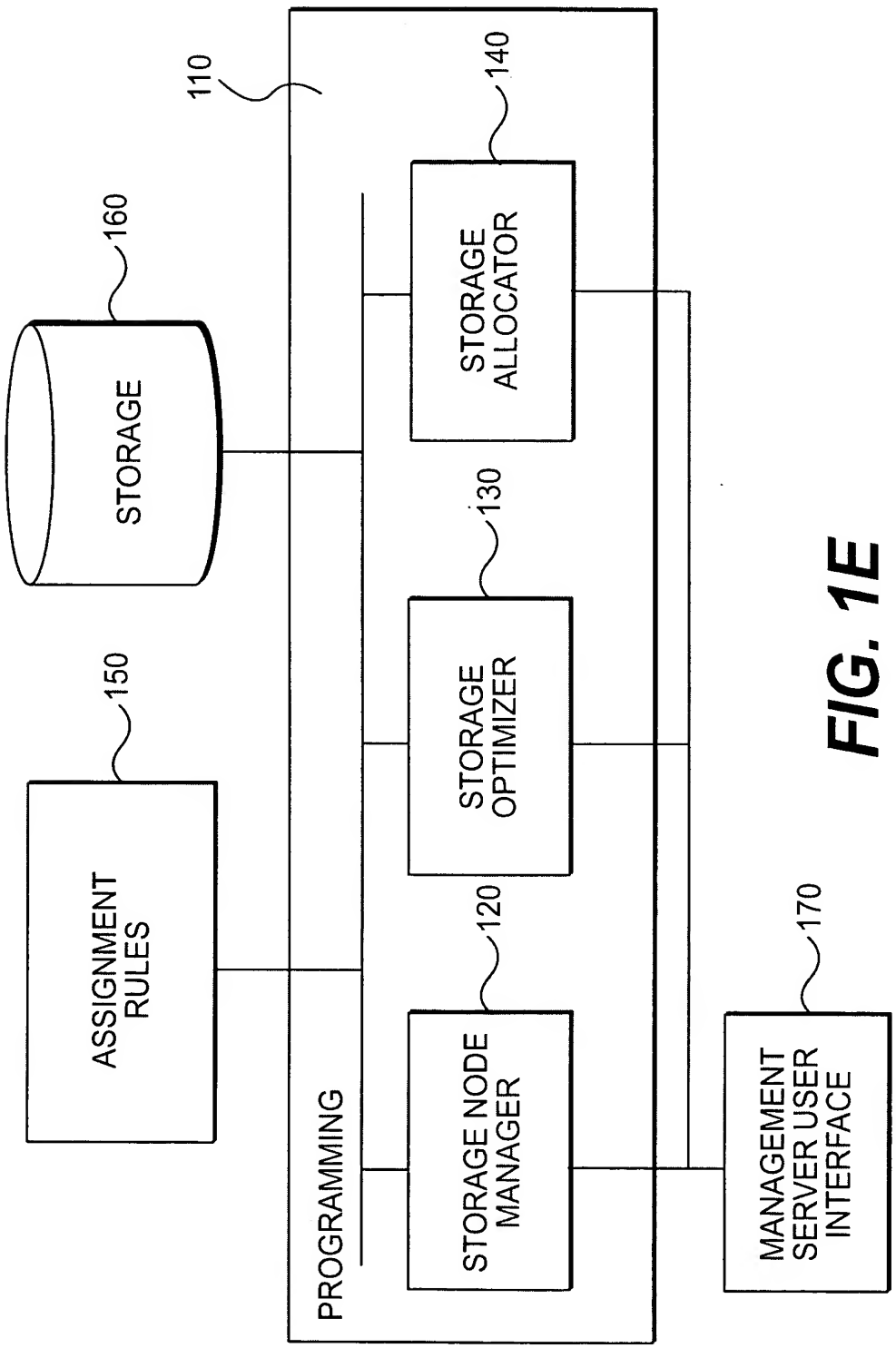
110
140
STORAGE ALLOCATOR
160
STORAGE
130
STORAGE OPTIMIZER
150
ASSIGNMENT RULES
120
170
STORAGE NODE MANAGER
MANAGEMENT SERVER USER INTERFACE
PROGRAMMING

FIG. 1E

150

ASSIGNABLE ITEMS

	LUN	LUN GROUP	ASSOCIATED LUN GROUP	HOST	HOST GROUP
HOSTS	X		X		
ASSOCIATE LUN GROUPS	X				
SHARE GOUPS	X		X	X	
LUN GROUPS	X	X			
HOST GROUPS				X	X

FIG. 1F

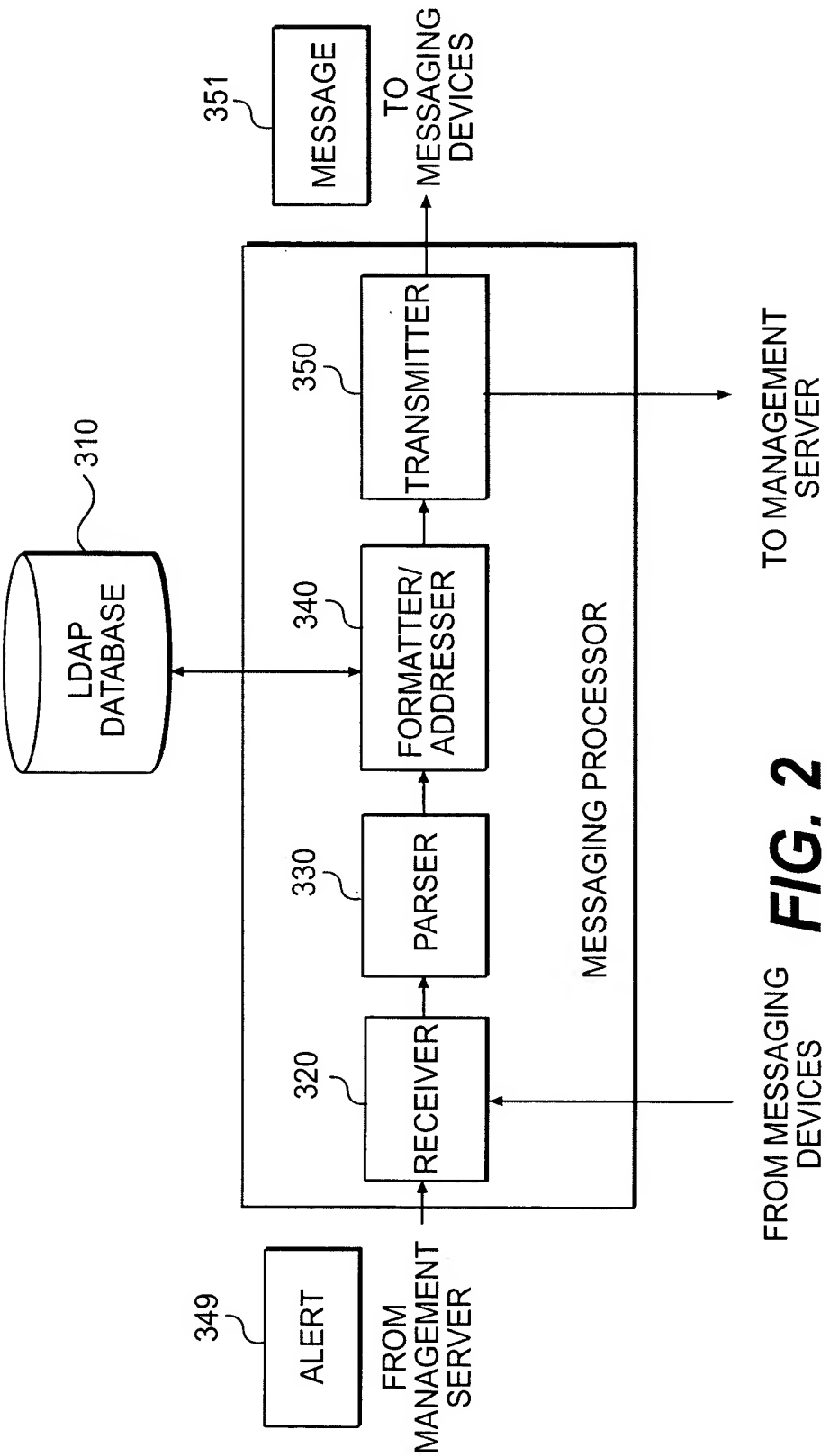
351
MESSAGE
TO MESSAGING DEVICES
350
TRANSMITTER
310
LDAP DATABASE
340
FORMATTER/ ADDRESSER
TO MANAGEMENT SERVER
330
PARSER
MESSAGING PROCESSOR
320
RECEIVER
FROM MESSAGING DEVICES
349
ALERT
FROM MANAGEMENT SERVER

FIG. 2

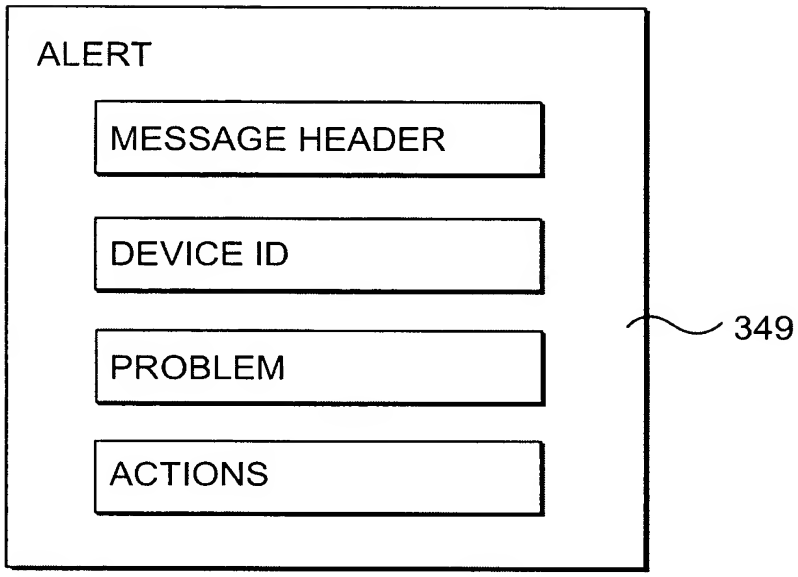

FIG. 3

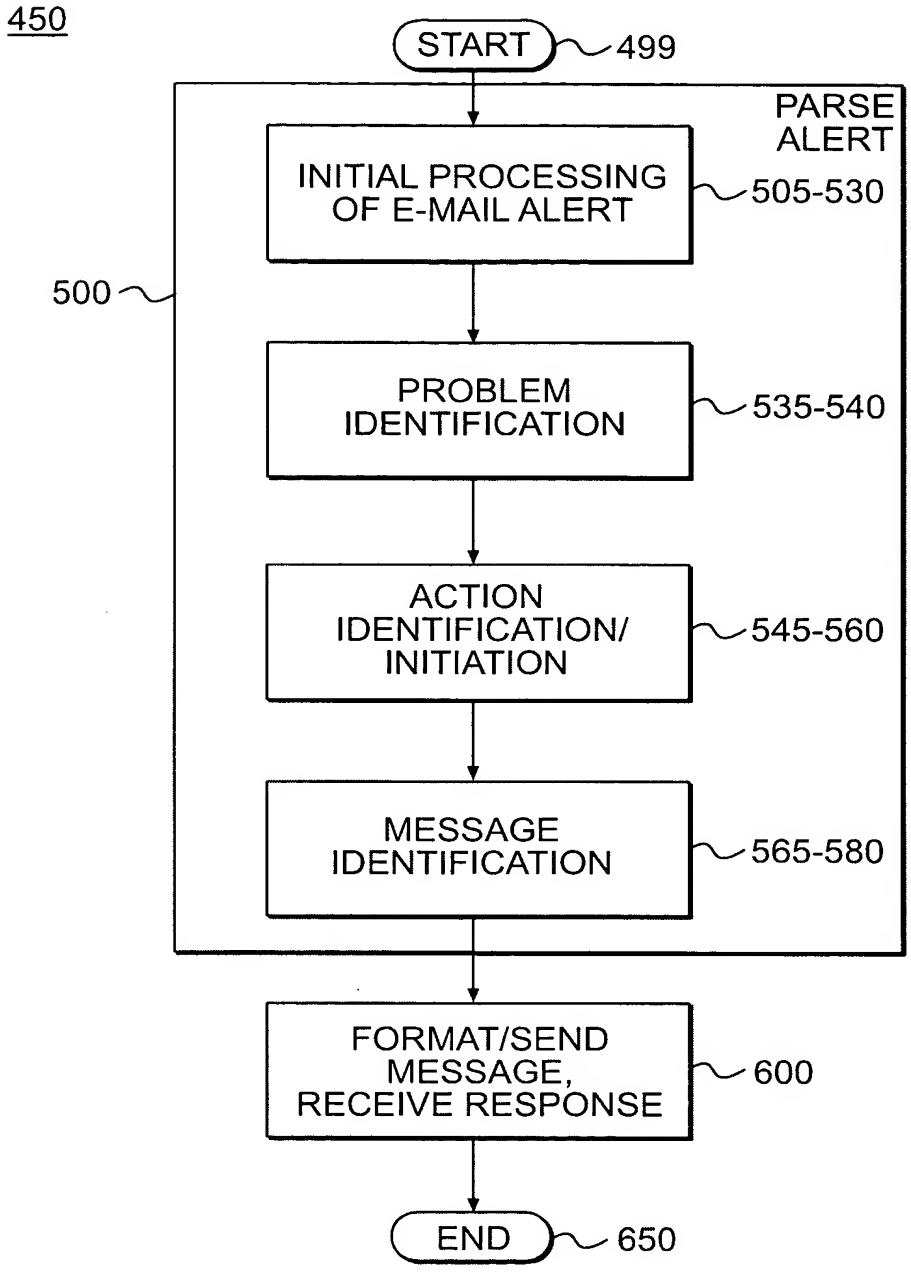
450
START
499
PARSE ALERT
INITIAL PROCESSING OF E-MAIL ALERT
505-530
500
PROBLEM IDENTIFICATION
535-540
ACTION IDENTIFICATION/ INITIATION
545-560
MESSAGE IDENTIFICATION
565-580
FORMAT/SEND MESSAGE, RECEIVE RESPONSE
600
END
650

FIG. 4A

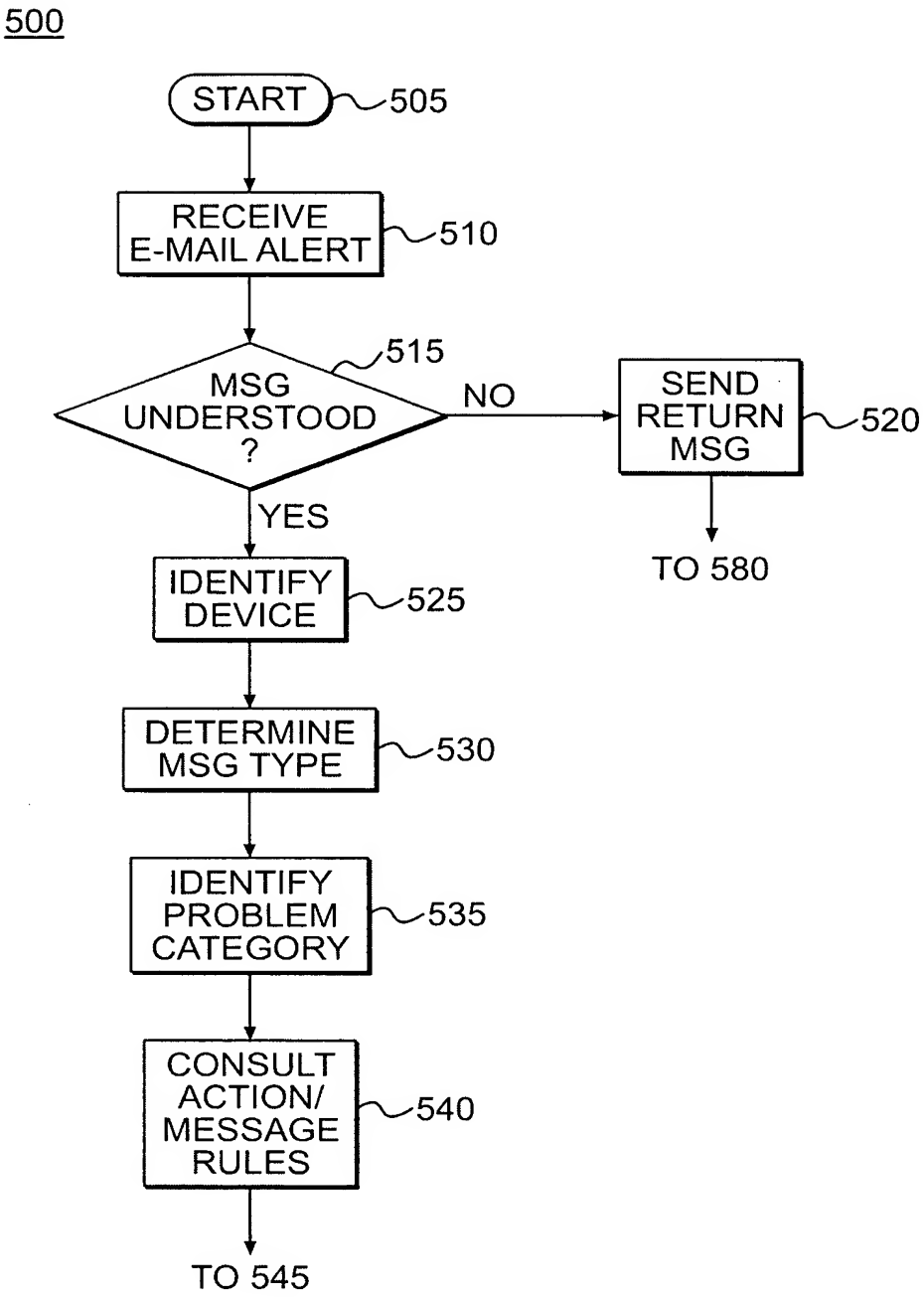
500
START
505
RECEIVE E-MAIL ALERT
510
MSG UNDERSTOOD ?
515
NO
SEND RETURN MSG
520
TO 580
YES
IDENTIFY DEVICE
525
DETERMINE MSG TYPE
530
IDENTIFY PROBLEM CATEGORY
535
CONSULT ACTION/ MESSAGE RULES
540
TO 545

FIG. 4B

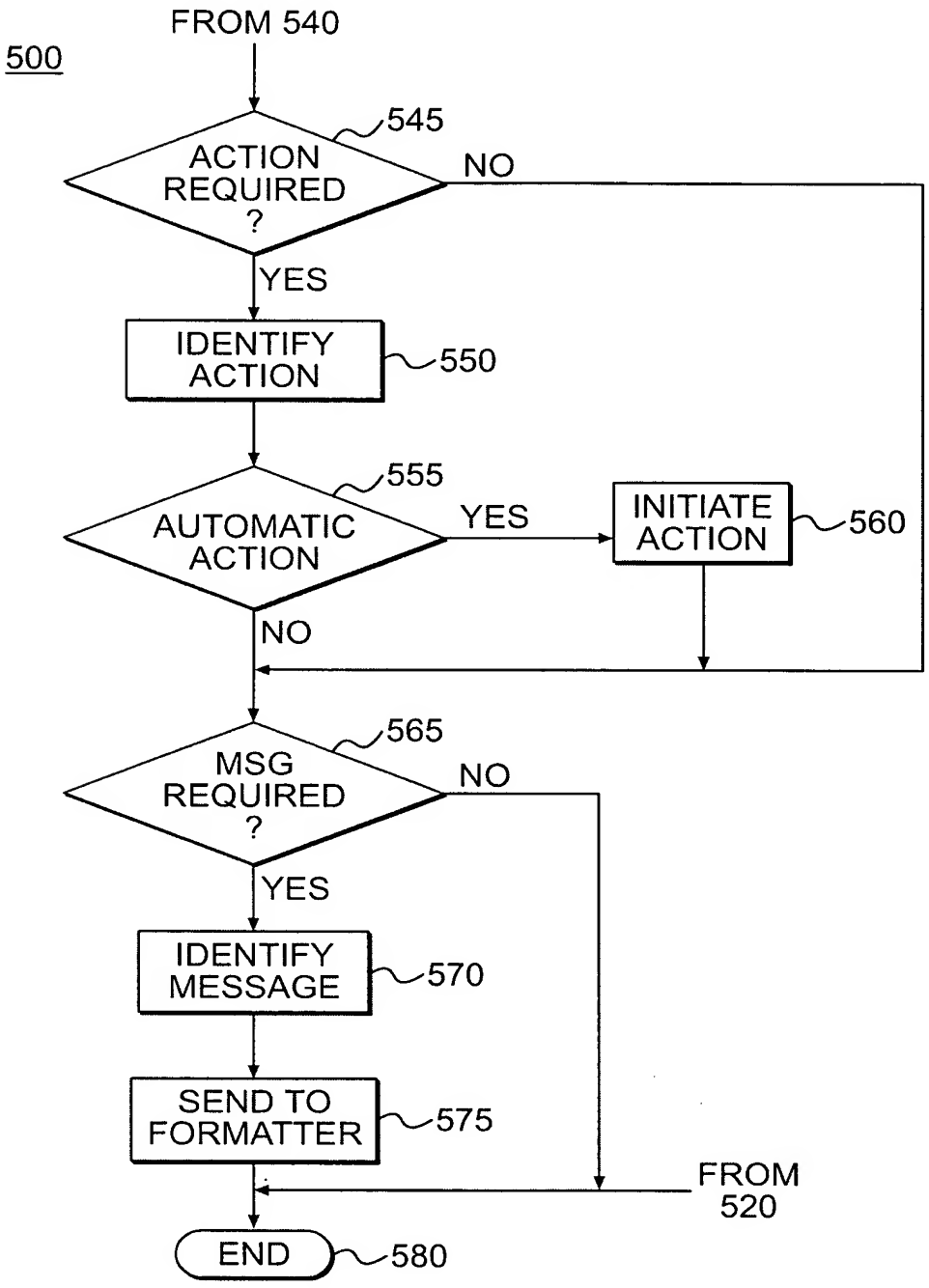
500
FROM 540
545
ACTION REQUIRED ?
NO
YES
IDENTIFY ACTION
550
555
AUTOMATIC ACTION
YES
INITIATE ACTION
560
NO
565
MSG REQUIRED ?
NO
YES
IDENTIFY MESSAGE
570
SEND TO FORMATTER
575
FROM 520
END
580

FIG. 4C

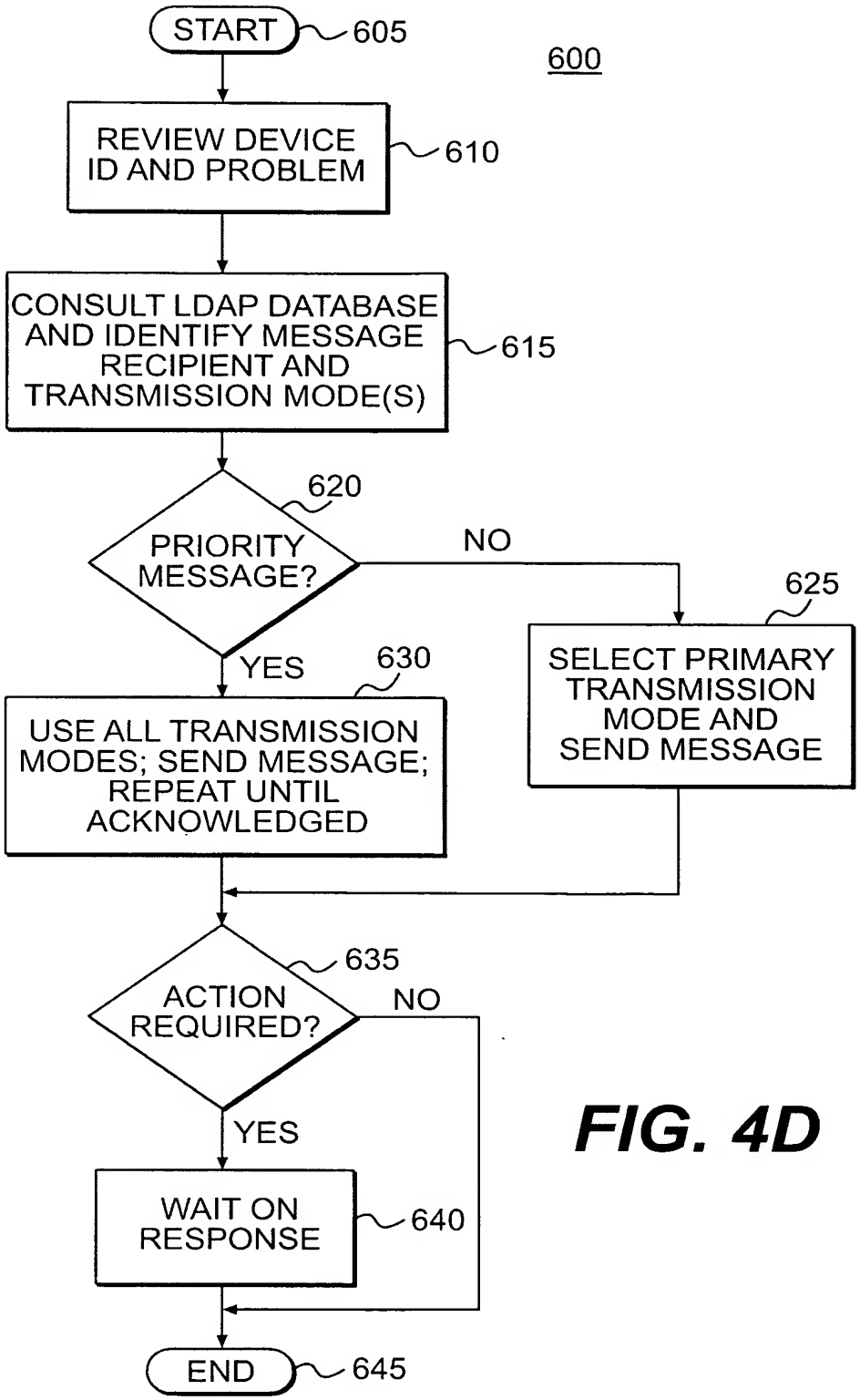
START
605
600
REVIEW DEVICE ID AND PROBLEM
610
CONSULT LDAP DATABASE AND IDENTIFY MESSAGE RECIPIENT AND TRANSMISSION MODE(S)
615
620
PRIORITY MESSAGE?
NO
625
SELECT PRIMARY TRANSMISSION MODE AND SEND MESSAGE
YES
630
USE ALL TRANSMISSION MODES; SEND MESSAGE; REPEAT UNTIL ACKNOWLEDGED
635
ACTION REQUIRED?
NO
YES
WAIT ON RESPONSE
640
END
645

FIG. 4D

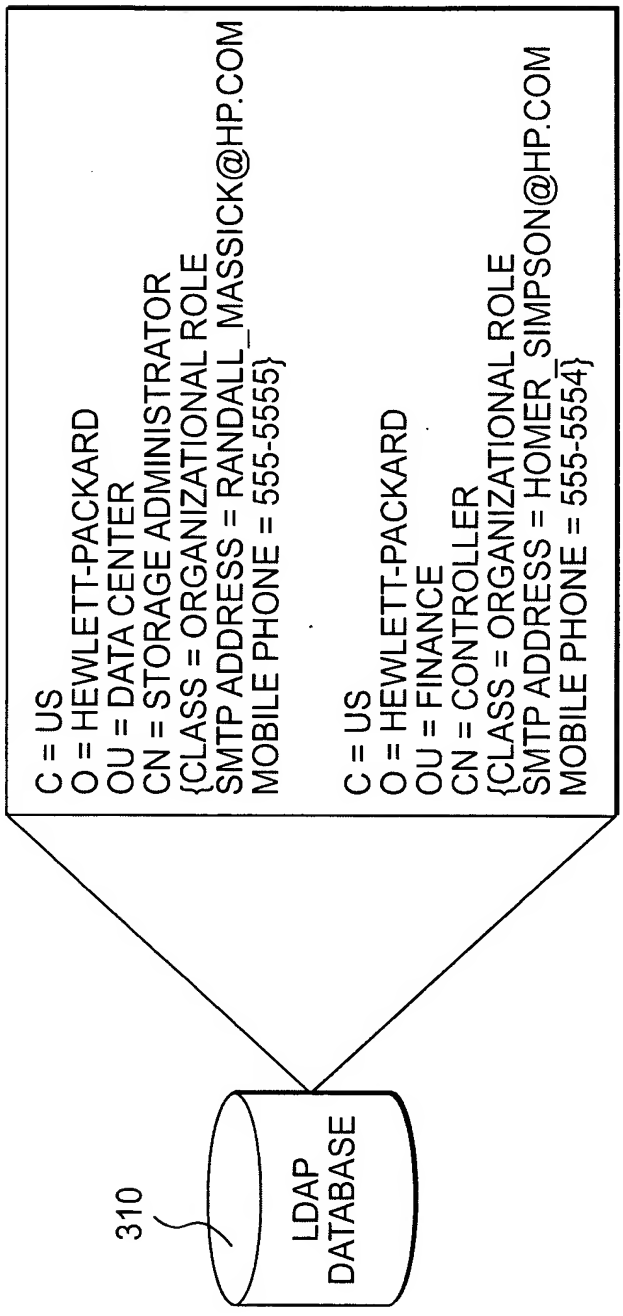
C = US
O = HEWLETT-PACKARD
OU = DATA CENTER
CN = STORAGE ADMINISTRATOR
{CLASS = ORGANIZATIONAL ROLE
SMTP ADDRESS = RANDALL_MASSICK@HP.COM
MOBILE PHONE = 555-5555}
C = US
O = HEWLETT-PACKARD
OU = FINANCE
CN = CONTROLLER
{CLASS = ORGANIZATIONAL ROLE
SMTP ADDRESS = HOMER_SIMPSON@HP.COM
MOBILE PHONE = 555-5554}
310
LDAP DATABASE

FIG. 5